SEQUENCE LISTING

<110> The Curators of the University of Missouri

<120> PHAGE DISPLAY SELECTION OF ANTI FUNGAL PEPTIDES

<130> UMO 1521.1

<140> US 09/829,549
<141> 2001-04-10

<150> US 60/195,785
<151> 2000-04-10

<160> 48

<170> PatentIn version 3.0

<210> 1
<211> 33
<212> PRT
<213> Type 88 filamentous bacteriophage

<220>
<221> VARIANT
<222> (9)..(23)
<223> x=any amino acid encoded by the codon NNK

<400> 1

Leu Val Pro Met Leu Ser Phe Ala Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ala Glu Gly Asp Asp Pro Ala Lys
20 25 30

Ala

<210> 2
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(20)
<223> Primer

<400> 2
ggagccttta attgtatcgg 20

<210> 3
<211> 19

<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(19)
<223> Primer

<400> 3
agtagcagaa gcctgaaga 19

<210> 4
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 4

Ala Ala Pro Asp Leu Gln Asp Ala Met
1 5

<210> 5
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 5

Ala Asp Arg Leu Asn Ser Asp Ala Gly
1 5

<210> 6
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 6

Ala Asp Arg Pro Ser Thr Thr Ser Leu
1 5

<210> 7
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 7

Ala Asp Pro Pro Arg Thr Val Ser Thr
1 5

<210> 8
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 8

Ala Asp Arg Pro Ser Met Ser Pro Thr
1 5

<210> 9
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 9

Ala Asp Arg Thr Ser Asn Ala Ser Thr
1 5

<210> 10
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 10

Ala Asp Lys Ser Tyr Ile Pro Ser Ser
1 5

<210> 11
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 11

Ala Val Arg Asn Pro Ser His His Ser
1 5

<210> 12
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 12

Ala Asp Pro Thr Pro Arg Gly His Ser
1 5

<210> 13
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 13

Ala Asp Pro Thr Arg Gln Pro His Ser

1 5

<210> 14
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 14

Ala Glu His Gln Asn Ser Ala Gly Pro
1 5

<210> 15
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(10)
<223> Random peptide insert

<400> 15

Ala Asp Ala Arg Ser Ala Gly Ala Ile Ser
1 5 10

<210> 16
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 16

Ala Asp Ser Lys Asn Ala Gly Pro Met
1 5

<210> 17
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN

<222> (1)..(9)
<223> Random peptide insert

<400> 17

Ala Glu Thr Lys Phe Ser Gly Ser Ala
1 5

<210> 18
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 18

Ala Asp Pro Lys Gly Ser Gly Val Thr
1 5

<210> 19
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 19

Ala Gly Leu Thr Ser Pro Asn Asp Met
1 5

<210> 20
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 20

Ala Asp Ile Thr Asp Pro Met Gly Ala
1 5

<210> 21
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 21

Ala Val Gly Thr His Thr Pro Asp Ser
1 5

<210> 22
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 22

Ala Val Ser Pro Asn Val His Asp Gly
1 5

<210> 23
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 23

Val Ala Ala Phe Ser Leu Val Trp Ala Thr His Leu Met Leu Ser
1 5 10 15

<210> 24
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 24

Leu Thr Arg Cys Leu Val Ser Thr Glu Met Ala Ala Arg Arg Pro
1 5 10 15

<210> 25
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 25

Ser Ala Pro Tyr Leu Pro Tyr Phe Asp Leu Leu His Phe Pro Ile
1 5 10 15

<210> 26
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (14)..(14)
<223> x=unknown amino acid

<400> 26

Pro Ser Ser Tyr Glu Ala Ser Arg Arg Pro Glu His Trp Xaa Phe
1 5 10 15

<210> 27
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 27

Ser Ala Thr Asp Thr Thr Leu Pro Met Met Thr Ala Ile Arg Ser
1 5 10 15

<210> 28
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (9)..(9)
<223> x=unknown amino acid

<400> 28

Thr Arg Leu Ser Pro Met Glu Ser Xaa Ala Met Leu Leu Ala Pro
1 5 10 15

<210> 29
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 29

Leu Leu Pro Val Ser Pro Pro Phe Ala Pro Asn Ala Ser Ser Thr
1 5 10 15

<210> 30
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 30

Met Ser Asn Phe Pro Thr Ser His Ala Pro Cys Pro Val Glu Ile
1 5 10 15

<210> 31
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 31

Glu Phe Arg Lys Asn Tyr Pro Ser Ala Ala Pro Leu Ile Pro Arg
1 5 10 15

<210> 32
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (2)..(2)
<223> x=unknown amino acid

<400> 32

Pro Xaa Val His Gly Ser Ile Pro Leu Thr Pro Pro Leu Gly Phe
1 5 10 15

<210> 33
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (3)..(3)
<223> x=unknown amino acid

<400> 33

Leu Phe Xaa Cys Tyr Pro Pro Cys Thr Tyr Ser Tyr Cys Leu Ser
1 5 10 15

<210> 34
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (14)..(14)
<223> x=unknown amino acid

<400> 34

Met Ser Asn Phe Pro Thr Ser His Ala Pro Cys Pro Val Xaa Ile
1 5 10 15

<210> 35
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 35

Pro Glu Trp Lys Ser Ser Trp Ser Pro Cys Thr Pro Arg Cys Pro
1 5 10 15

<210> 36
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (11)..(11)
<223> x=unknown amino acid

<400> 36

Ala Met Ser Arg Trp Leu Arg Pro Arg Glu Xaa Asn Ala Pro Pro
1 5 10 15

<210> 37
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (6)..(6)
<223> x=unknown amino acid

<220>
<221> VARIANT
<222> (10)..(10)
<223> x=unknown amino acid

<400> 37

Thr His Thr Thr Phe Xaa Val Thr Val Xaa Leu His Glu Pro Pro
1 5 10 15

<210> 38
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 38

Met Thr Ser Pro Arg Asn Ser Gln Leu Ile Val Pro Phe Cys Leu
1 5 10 15

<210> 39
<211> 15
<212> PRT
<213> Artificial Sequence

<220>

<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 39

Pro Thr Leu Gly Arg Phe Asn Arg Pro Ser Cys Ser Ile Ile Val
1 5 10 15

<210> 40
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 40

Ala Pro Gln Cys His Pro His Leu Pro Phe Asp Met Ile His Val
1 5 10 15

<210> 41
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (12)..(12)
<223> x=unknown amino acid

<400> 41

Asn His Asn Ser Leu Pro Ala Gln Tyr Leu Val Xaa Ile Leu Arg
1 5 10 15

<210> 42
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 42

Asp Gln Pro Cys Thr Pro Ser Pro Asp Val Ser Phe Tyr Arg Ser
1 5 10 15

<210> 43
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 43

Val Ala Ala Pro Ser His Trp Leu Lys Pro Ser Leu Asp Cys Phe
1 5 10 15

<210> 44
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 44

Asn Pro Leu Tyr Lys Asn Pro Pro Pro Arg Val Ala Met Cys Leu
1 5 10 15

<210> 45
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 45

Leu Ile Phe Arg Tyr Ala Pro Pro Pro Leu Phe Leu Arg Pro Pro
1 5 10 15

<210> 46
<211> 36

<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(36)
<223> + strand of DNA encoding random peptide Pc 87

<400> 46
agctagcaga tagaccatca atgtcaccaa catagt 36

<210> 47
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(36)
<223> - strand of DNA encoding peptide Pc 87

<400> 47
ctagactatg ttggtgacat tgatggtcta tctgct 36

<210> 48
<211> 611
<212> PRT
<213> Artificial Sequence

<220>
<221> SIGNAL
<222> (1)..(85)
<223> Mat-alpha secretory sequence

<220>
<221> DOMAIN
<222> (86)..(600)
<223> Cytokinin oxidase 1

<220>
<221> DOMAIN
<222> (601)..(602)
<223> Linker

<220>
<221> DOMAIN
<222> (603)..(611)
<223> Random peptide Pc 87

<400> 48

```
Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser
1               5                  10                  15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln
            20                  25                  30

Ile Pro Ala Asp Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe
        35                  40                  45

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu
    50                  55                  60

Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val
65                  70                  75                  80

Ser Leu Glu Lys Arg Leu Ala Ala Gly Thr Pro Ala Leu Gly Asp Asp
                85                  90                  95

Arg Gly Arg Pro Trp Pro Ala Ser Leu Ala Ala Leu Ala Leu Asp Gly
            100                 105                 110

Lys Leu Arg Thr Asp Ser Asn Ala Thr Ala Ala Ala Ser Thr Asp Phe
        115                 120                 125

Gly Asn Ile Thr Ser Ala Leu Pro Ala Ala Val Leu Tyr Pro Ser Thr
    130                 135                 140

Gly Asp Leu Val Ala Leu Leu Ser Ala Ala Asn Ser Thr Pro Gly Trp
145                 150                 155                 160

Pro Tyr Thr Ile Ala Phe Arg Gly Arg Gly His Ser Leu Met Gly Gln
                165                 170                 175

Ala Phe Ala Pro Gly Gly Val Val Val Asn Met Ala Ser Leu Gly Asp
            180                 185                 190

Ala Ala Ala Pro Pro Arg Ile Asn Val Ser Ala Asp Gly Arg Tyr Val
        195                 200                 205

Asp Ala Gly Gly Glu Gln Val Trp Ile Asp Val Leu Arg Ala Ser Leu
    210                 215                 220

Ala Arg Gly Val Ala Pro Arg Ser Trp Asn Asp Tyr Leu Tyr Leu Thr
225                 230                 235                 240

Val Gly Gly Thr Leu Ser Asn Ala Gly Ile Ser Gly Gln Ala Phe Arg
                245                 250                 255

His Gly Pro Gln Ile Ser Asn Val Leu Glu Met Asp Val Ile Thr Gly
            260                 265                 270

His Gly Glu Met Val Thr Cys Ser Lys Gln Leu Asn Ala Asp Leu Phe
        275                 280                 285

Asp Ala Val Leu Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala
```

```
    290                 295                 300

Arg Ile Ala Val Glu Pro Ala Pro Ala Arg Ala Arg Trp Val Arg Phe
305                 310                 315                 320

Val Tyr Thr Asp Phe Ala Ala Phe Ser Ala Asp Gln Glu Arg Leu Thr
                325                 330                 335

Ala Pro Arg Pro Gly Gly Gly Gly Ala Ser Phe Gly Pro Met Ser Tyr
            340                 345                 350

Val Glu Gly Ser Val Phe Val Asn Gln Ser Leu Ala Thr Asp Leu Ala
        355                 360                 365

Asn Thr Gly Phe Phe Thr Asp Ala Asp Val Ala Arg Ile Val Ala Leu
    370                 375                 380

Ala Gly Glu Arg Asn Ala Thr Thr Val Tyr Ser Ile Glu Ala Thr Leu
385                 390                 395                 400

Asn Tyr Asp Asn Ala Thr Ala Ala Ala Ala Ala Val Asp Gln Glu Leu
                405                 410                 415

Ala Ser Val Leu Gly Thr Leu Ser Tyr Val Glu Gly Phe Ala Phe Gln
            420                 425                 430

Arg Asp Val Ala Tyr Ala Ala Phe Leu Asp Arg Val His Gly Glu Glu
        435                 440                 445

Val Ala Leu Asn Lys Leu Gly Leu Trp Arg Val Pro His Pro Trp Leu
    450                 455                 460

Asn Met Phe Val Pro Arg Ser Arg Ile Ala Asp Phe Asp Arg Gly Val
465                 470                 475                 480

Phe Lys Gly Ile Leu Gln Gly Thr Asp Ile Val Gly Pro Leu Ile Val
                485                 490                 495

Tyr Pro Leu Asn Lys Ser Met Trp Asp Asp Gly Met Ser Ala Ala Thr
            500                 505                 510

Pro Ser Glu Asp Val Phe Tyr Ala Val Ser Leu Leu Phe Ser Ser Val
        515                 520                 525

Ala Pro Asn Asp Leu Ala Arg Leu Gln Glu Gln Asn Arg Arg Ile Leu
    530                 535                 540

Arg Phe Cys Asp Leu Ala Gly Ile Gln Tyr Lys Thr Tyr Leu Ala Arg
545                 550                 555                 560

His Thr Asp Arg Ser Asp Trp Val Arg His Phe Gly Ala Ala Lys Trp
                565                 570                 575

Asn Arg Phe Val Glu Met Lys Asn Lys Tyr Asp Pro Lys Arg Leu Leu
            580                 585                 590

Ser Pro Gly Gln Asp Ile Phe Asn Lys Leu Ala Asp Arg Pro Ser Met
```

595 600 605

Ser Pro Thr
610

SEQUENCE LISTING

<110> The Curators of the University of Missouri

<120> PHAGE DISPLAY SELECTION OF ANTI FUNGAL PEPTIDES

<130> UMO 1521.1

<140> US 09/829,549
<141> 2001-04-10

<150> US 60/195,785
<151> 2000-04-10

<160> 48

<170> PatentIn version 3.0

<210> 1
<211> 33
<212> PRT
<213> Type 88 filamentous bacteriophage

<220>
<221> VARIANT
<222> (9)..(23)
<223> x=any amino acid encoded by the codon NNK

<400> 1

Leu Val Pro Met Leu Ser Phe Ala Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ala Glu Gly Asp Asp Pro Ala Lys
20 25 30

Ala

<210> 2
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(20)
<223> Primer

<400> 2
ggagccttta attgtatcgg 20

<210> 3
<211> 19

<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(19)
<223> Primer

<400> 3
agtagcagaa gcctgaaga 19

<210> 4
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 4

Ala Ala Pro Asp Leu Gln Asp Ala Met
1 5

<210> 5
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 5

Ala Asp Arg Leu Asn Ser Asp Ala Gly
1 5

<210> 6
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 6

Ala Asp Arg Pro Ser Thr Thr Ser Leu
1 5

<210> 7
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 7

Ala Asp Pro Pro Arg Thr Val Ser Thr
1 5

<210> 8
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 8

Ala Asp Arg Pro Ser Met Ser Pro Thr
1 5

<210> 9
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 9

Ala Asp Arg Thr Ser Asn Ala Ser Thr
1 5

<210> 10
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 10

Ala Asp Lys Ser Tyr Ile Pro Ser Ser
1 5

<210> 11
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 11

Ala Val Arg Asn Pro Ser His His Ser
1 5

<210> 12
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 12

Ala Asp Pro Thr Pro Arg Gly His Ser
1 5

<210> 13
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 13

Ala Asp Pro Thr Arg Gln Pro His Ser

1 5

<210> 14
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 14

Ala Glu His Gln Asn Ser Ala Gly Pro
1 5

<210> 15
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(10)
<223> Random peptide insert

<400> 15

Ala Asp Ala Arg Ser Ala Gly Ala Ile Ser
1 5 10

<210> 16
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 16

Ala Asp Ser Lys Asn Ala Gly Pro Met
1 5

<210> 17
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN

<222> (1)..(9)
<223> Random peptide insert

<400> 17

Ala Glu Thr Lys Phe Ser Gly Ser Ala
1 5

<210> 18
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 18

Ala Asp Pro Lys Gly Ser Gly Val Thr
1 5

<210> 19
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 19

Ala Gly Leu Thr Ser Pro Asn Asp Met
1 5

<210> 20
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 20

Ala Asp Ile Thr Asp Pro Met Gly Ala
1 5

<210> 21
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 21

Ala Val Gly Thr His Thr Pro Asp Ser
1 5

<210> 22
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(9)
<223> Random peptide insert

<400> 22

Ala Val Ser Pro Asn Val His Asp Gly
1 5

<210> 23
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 23

Val Ala Ala Phe Ser Leu Val Trp Ala Thr His Leu Met Leu Ser
1 5 10 15

<210> 24
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 24

Leu Thr Arg Cys Leu Val Ser Thr Glu Met Ala Ala Arg Arg Pro
1 5 10 15

<210> 25
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 25

Ser Ala Pro Tyr Leu Pro Tyr Phe Asp Leu Leu His Phe Pro Ile
1 5 10 15

<210> 26
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (14)..(14)
<223> x=unknown amino acid

<400> 26

Pro Ser Ser Tyr Glu Ala Ser Arg Arg Pro Glu His Trp Xaa Phe
1 5 10 15

<210> 27
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 27

Ser Ala Thr Asp Thr Thr Leu Pro Met Met Thr Ala Ile Arg Ser
1 5 10 15

<210> 28
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (9)..(9)
<223> x=unknown amino acid

<400> 28

Thr Arg Leu Ser Pro Met Glu Ser Xaa Ala Met Leu Leu Ala Pro
1 5 10 15

<210> 29
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 29

Leu Leu Pro Val Ser Pro Pro Phe Ala Pro Asn Ala Ser Ser Thr
1 5 10 15

<210> 30
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 30

Met Ser Asn Phe Pro Thr Ser His Ala Pro Cys Pro Val Glu Ile
1 5 10 15

<210> 31
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 31

Glu Phe Arg Lys Asn Tyr Pro Ser Ala Ala Pro Leu Ile Pro Arg
1 5 10 15

<210> 32
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (2)..(2)
<223> x=unknown amino acid

<400> 32

Pro Xaa Val His Gly Ser Ile Pro Leu Thr Pro Pro Leu Gly Phe
1 5 10 15

<210> 33
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (3)..(3)
<223> x=unknown amino acid

<400> 33

Leu Phe Xaa Cys Tyr Pro Pro Cys Thr Tyr Ser Tyr Cys Leu Ser
1 5 10 15

<210> 34
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (14)..(14)
<223> x=unknown amino acid

<400> 34

Met Ser Asn Phe Pro Thr Ser His Ala Pro Cys Pro Val Xaa Ile
1 5 10 15

<210> 35
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 35

Pro Glu Trp Lys Ser Ser Trp Ser Pro Cys Thr Pro Arg Cys Pro
1 5 10 15

<210> 36
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (11)..(11)
<223> x=unknown amino acid

<400> 36

Ala Met Ser Arg Trp Leu Arg Pro Arg Glu Xaa Asn Ala Pro Pro
1 5 10 15

<210> 37
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (6)..(6)
<223> x=unknown amino acid

<220>
<221> VARIANT
<222> (10)..(10)
<223> x=unknown amino acid

<400> 37

Thr His Thr Thr Phe Xaa Val Thr Val Xaa Leu His Glu Pro Pro
1 5 10 15

<210> 38
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 38

Met Thr Ser Pro Arg Asn Ser Gln Leu Ile Val Pro Phe Cys Leu
1 5 10 15

<210> 39
<211> 15
<212> PRT
<213> Artificial Sequence

<220>

<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 39

Pro Thr Leu Gly Arg Phe Asn Arg Pro Ser Cys Ser Ile Ile Val
1 5 10 15

<210> 40
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 40

Ala Pro Gln Cys His Pro His Leu Pro Phe Asp Met Ile His Val
1 5 10 15

<210> 41
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<220>
<221> VARIANT
<222> (12)..(12)
<223> x=unknown amino acid

<400> 41

Asn His Asn Ser Leu Pro Ala Gln Tyr Leu Val Xaa Ile Leu Arg
1 5 10 15

<210> 42
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 42

Asp Gln Pro Cys Thr Pro Ser Pro Asp Val Ser Phe Tyr Arg Ser
1 5 10 15

<210> 43
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 43

Val Ala Ala Pro Ser His Trp Leu Lys Pro Ser Leu Asp Cys Phe
1 5 10 15

<210> 44
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 44

Asn Pro Leu Tyr Lys Asn Pro Pro Pro Arg Val Ala Met Cys Leu
1 5 10 15

<210> 45
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<221> DOMAIN
<222> (1)..(15)
<223> Random peptide insert

<400> 45

Leu Ile Phe Arg Tyr Ala Pro Pro Pro Leu Phe Leu Arg Pro Pro
1 5 10 15

<210> 46
<211> 36

<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(36)
<223> + strand of DNA encoding random peptide Pc 87

<400> 46
agctagcaga tagaccatca atgtcaccaa catagt 36

<210> 47
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<221> misc_feature
<222> (1)..(36)
<223> - strand of DNA encoding peptide Pc 87

<400> 47
ctagactatg ttggtgacat tgatggtcta tctgct 36

<210> 48
<211> 611
<212> PRT
<213> Artificial Sequence

<220>
<221> SIGNAL
<222> (1)..(85)
<223> Mat-alpha secretory sequence

<220>
<221> DOMAIN
<222> (86)..(600)
<223> Cytokinin oxidase 1

<220>
<221> DOMAIN
<222> (601)..(602)
<223> Linker

<220>
<221> DOMAIN
<222> (603)..(611)
<223> Random peptide Pc 87

<400> 48

```
Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser
1               5                  10                  15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln
            20                  25                  30

Ile Pro Ala Asp Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe
        35                  40                  45

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu
    50                  55                  60

Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val
65                  70                  75                  80

Ser Leu Glu Lys Arg Leu Ala Ala Gly Thr Pro Ala Leu Gly Asp Asp
                85                  90                  95

Arg Gly Arg Pro Trp Pro Ala Ser Leu Ala Ala Leu Ala Leu Asp Gly
            100                 105                 110

Lys Leu Arg Thr Asp Ser Asn Ala Thr Ala Ala Ala Ser Thr Asp Phe
        115                 120                 125

Gly Asn Ile Thr Ser Ala Leu Pro Ala Ala Val Leu Tyr Pro Ser Thr
    130                 135                 140

Gly Asp Leu Val Ala Leu Leu Ser Ala Ala Asn Ser Thr Pro Gly Trp
145                 150                 155                 160

Pro Tyr Thr Ile Ala Phe Arg Gly Arg Gly His Ser Leu Met Gly Gln
                165                 170                 175

Ala Phe Ala Pro Gly Gly Val Val Val Asn Met Ala Ser Leu Gly Asp
            180                 185                 190

Ala Ala Ala Pro Pro Arg Ile Asn Val Ser Ala Asp Gly Arg Tyr Val
        195                 200                 205

Asp Ala Gly Gly Glu Gln Val Trp Ile Asp Val Leu Arg Ala Ser Leu
    210                 215                 220

Ala Arg Gly Val Ala Pro Arg Ser Trp Asn Asp Tyr Leu Tyr Leu Thr
225                 230                 235                 240

Val Gly Gly Thr Leu Ser Asn Ala Gly Ile Ser Gly Gln Ala Phe Arg
                245                 250                 255

His Gly Pro Gln Ile Ser Asn Val Leu Glu Met Asp Val Ile Thr Gly
            260                 265                 270

His Gly Glu Met Val Thr Cys Ser Lys Gln Leu Asn Ala Asp Leu Phe
        275                 280                 285

Asp Ala Val Leu Gly Gly Leu Gly Gln Phe Gly Val Ile Thr Arg Ala
```

```
    290                 295                 300

Arg Ile Ala Val Glu Pro Ala Pro Ala Arg Ala Arg Trp Val Arg Phe
305                 310                 315                 320

Val Tyr Thr Asp Phe Ala Ala Phe Ser Ala Asp Gln Glu Arg Leu Thr
                325                 330                 335

Ala Pro Arg Pro Gly Gly Gly Gly Ala Ser Phe Gly Pro Met Ser Tyr
            340                 345                 350

Val Glu Gly Ser Val Phe Val Asn Gln Ser Leu Ala Thr Asp Leu Ala
        355                 360                 365

Asn Thr Gly Phe Phe Thr Asp Ala Asp Val Ala Arg Ile Val Ala Leu
    370                 375                 380

Ala Gly Glu Arg Asn Ala Thr Thr Val Tyr Ser Ile Glu Ala Thr Leu
385                 390                 395                 400

Asn Tyr Asp Asn Ala Thr Ala Ala Ala Ala Ala Val Asp Gln Glu Leu
                405                 410                 415

Ala Ser Val Leu Gly Thr Leu Ser Tyr Val Glu Gly Phe Ala Phe Gln
            420                 425                 430

Arg Asp Val Ala Tyr Ala Ala Phe Leu Asp Arg Val His Gly Glu Glu
        435                 440                 445

Val Ala Leu Asn Lys Leu Gly Leu Trp Arg Val Pro His Pro Trp Leu
    450                 455                 460

Asn Met Phe Val Pro Arg Ser Arg Ile Ala Asp Phe Asp Arg Gly Val
465                 470                 475                 480

Phe Lys Gly Ile Leu Gln Gly Thr Asp Ile Val Gly Pro Leu Ile Val
                485                 490                 495

Tyr Pro Leu Asn Lys Ser Met Trp Asp Asp Gly Met Ser Ala Ala Thr
            500                 505                 510

Pro Ser Glu Asp Val Phe Tyr Ala Val Ser Leu Leu Phe Ser Ser Val
        515                 520                 525

Ala Pro Asn Asp Leu Ala Arg Leu Gln Glu Gln Asn Arg Arg Ile Leu
    530                 535                 540

Arg Phe Cys Asp Leu Ala Gly Ile Gln Tyr Lys Thr Tyr Leu Ala Arg
545                 550                 555                 560

His Thr Asp Arg Ser Asp Trp Val Arg His Phe Gly Ala Ala Lys Trp
                565                 570                 575

Asn Arg Phe Val Glu Met Lys Asn Lys Tyr Asp Pro Lys Arg Leu Leu
            580                 585                 590

Ser Pro Gly Gln Asp Ile Phe Asn Lys Leu Ala Asp Arg Pro Ser Met
```

595 600 605

Ser Pro Thr
610